

JOURNAL

OF THE

Bombay Natural History Society.

APRIL 1937.

VOL. XXXIX.

No. 2.

THE GAME FISHES OF INDIA.¹

BY

SUNDER LAL HORA, D.Sc., F.R.S.E., F.L.S., F.Z.S., F.R.A.S.B., F.N.I.,

Assistant Superintendent, Zoological Survey of India, Calcutta.

(With one plate and 3 text-figures).

PREFATORY NOTE.

For a number of years the Editors have been urging me to contribute to the Society's *Journal* a series of articles on the Game Fishes of India on the model of Mr. Stuart Baker's excellent series entitled 'The Game Birds of the Indian Empire'. Unfortunately the taxonomy of Indian fishes, especially of the freshwater forms, is in a state of great confusion and in some cases it is not even possible to define the precise generic and specific limits of the commonest forms, such as *Mahseer*, without a great deal of preliminary spade work. As enquiries are very often made regarding the habits and habitats of these fishes, it has been considered desirable to start the series, giving as much information about each species as is available. It is hoped that these articles will induce anglers and others interested in the subject to contribute their experience to the pages of the *Journal*, so as to enable us to have a better knowledge of these valuable fishes.

In writing up this series I shall first of all deal with forms of which I can easily obtain coloured sketches or about the taxonomy of which there does not appear to be much confusion. The order of the treatment of the various species will, therefore, not be in accordance with the systematic position of these forms.

I.—'THE INDIAN TROUT'.

BARILIUS (OPSARIUS) BOLA HAMILTON.

CONTENTS.

	PAGE
Introduction	200
Taxonomy	
Nomenclature	200
Systematic Position	204
Description and Distribution	204
Measurements	206
Economics and Fishing Notes	206
List of References	209

¹ Published with permission of the Director, Zoological Survey of India.

JUN 2 1937

INTRODUCTION.

The fondness of the Europeans for Trout-fishing is so great that even in India where no true Trout (Family: Salmonidae) existed before their advent, as a result of persistent efforts, two or three varieties of trout have now been introduced. Loch Leven Trout (*Salmo levenensis*) was the first to be imported and acclimatised into the Nilgiri Hills in the seventies of the last century (9).¹ Since then true Trout have been introduced into several other localities along the Himalayas where their culture is proving a great success. It may be remarked that in their natural state the nearest locality to India where they exist is the northern slope of the Hindu Kush in Afghanistan (15). There are in Northern India certain species of Carp which resemble true Trout either in form, lepidosis, colouration or sporting qualities and for these reasons they are commonly called 'Trout'. Such fishes include the 'Indian Trout',² known in scientific literature as *Barilius bola* Ham. The origin of the popular name and the relative qualities of the fish are thus described by Thomas (23):

'I have called it the Indian Trout, because it is commonly thus called in Northern India. Other competitors there are for the name; but *Barilius bola* seems to have the best title to be called the Indian Trout. To avoid confusion, therefore, we will commence by deposing the other fish which seem to have less right to the honourable distinction. *Oreinus richardsonii* has, according to Day, been called the "Kemaon Trout". "In some specimens there are black spots on the sides and head." Of *Oreinus sinuatus* Dr. Day writes in his *Fishes of India*, "some have scattered black and occasionally red spots, and these have been termed Trout". But this fish has a sucker with which it adheres to rocks, which is most untroutlike, and Dr. Day tells me it will not take a fly at any price, a piece of wrong-headedness for which, with your concurrence, it should be shorn of its brevet-rank, in spite of its red spots. *Oh formose puer nimium ne crede colori*—we will degrade you in spite of your looks. "Handsome is that handsome does" is the better rule, and as *Barilius bola* sports like a trout, as we shall see, let us allow his claim, though he has no adipose dorsal fin like the true trouts (Salmonidae). We may have the less hesitation in confirming the honorific as there are no indigenous trout in India.'

All along the Himalayas the small-scaled Barbels of the genera *Schizothorax* and *Oreinus* (Schizothoracinae) are sometimes termed 'Trout', but with these fishes we shall deal sometime later. Reference may, however, be made to the fact that there is a great superficial similarity between the Schizothoracinae and the Salmonidae and that the features of resemblances between them have been independently acquired under the stress of similar environmental conditions—rapid-running water over a rocky bed (1).

TAXONOMY.

Nomenclature.

As is unfortunately the case with a number of our well-known Game Fishes, such as *Mahseer*, the taxonomy of the 'Indian

¹ Numerals in thick type within brackets refer to the serial numbers of the various publications listed in the bibliography at the end of the paper.

² In some parts of India, especially the Eastern Himalayas, this fish goes by the name of 'Hill Trout'.

Trout' is also involved in a great confusion. It was originally described by Hamilton (13) in his second division of *Cyprinus* which he termed *Barilius* and defined as follows:

'Fishes of the genus *Cyprinus*, with the body very long and much compressed; with the sides irregularly marked with numerous incomplete transverse bars or spots; with the back fin placed considerably behind the middle of the fish; and with one lateral line at least running parallel to the lower edge of the fish.'

He further observed that

'The fishes of this division, on account of the numerous spots or marks on their sides, have a considerable resemblance to our Trout, and, by the English in Bengal, some of them have been considered as belonging to that genus; but they have only one fin on the back.'

Among the species included by Hamilton under *Barilius* are: (1) *Cyprinus barila*, (2) *C. chedrio*, (3) *C. barna*, (4) *C. vagra*, (5) *C. bendilisis*, (6) *C. shacra*, (7) *C. cocsa*, (8) *C. chedra*, (9) *C. tila*, (10) *C. bola*, (11) *C. goha* and (12) *C. tileo*. The majority of the species in this group are of little value, but in the case of *C. goha* Hamilton says:

'I have found this fish in the Kosi, Yamuna, and Son rivers, where it is called a *Trout* by the English. It grows to about the size of a herring, and is a fine flavoured delicate fish, somewhat resembling in taste the *Smelt* of Europe.'

Though Hamilton published the drawings of only two species of *Barilius*—*Cyprinus bendilisis* (4) and *C. cocsa* (13)—very fortunately there are drawings of seven other species in his collection of MS. drawings (14) now preserved in the library of the Royal Asiatic Society of Bengal. Of these MS. drawings, three were published by Gray (11) and five by McClelland (20), while two species—*C. chedrio* and *C. tila*—did not have any illustrations. It is beyond the scope of this paper to discuss the precise specific limits of all the species enumerated above, but it may be indicated that certain authors (9, 12, 17) have regarded *C. bola* and *C. goha* as conspecific, while some others (2, 5, 6, 20) have considered them as separate species. The conflicting views on this point may now be elucidated.

Of *C. bola* Hamilton says, 'It grows to four or five inches in length, and is little valued.' He found this species in the Brahmaputra 'with many oblong diffuse spots, and a longitudinal golden stripe on each side.' His *C. goha* is provided 'with many diffuse scattered spots on the sides', and grows to a much larger size. 'In other respects it has the closest resemblance to the *Bola* just now described; and I have only in addition to state, that the spots on the sides of the *Goha* are more numerous, more irregularly scattered, and rounded than those on the *Bola*.' These observations are fully borne out by his drawings of the two species.

Authors, who had series of specimens of these forms for examination, came to the conclusion that *C. bola* merely represents the juvenile stage of *C. goha*. Mukerji and I (17) recently studied this fish in its natural surroundings in the Dehra Dun hills and showed how the colour varies with age. In the colour drawings of the two Dehra Dun specimens reproduced here the juvenile

and the adult colouration are clearly brought out. These show conclusively that Hamilton's two species must be regarded as conspecific. As *bola* is described before *goha*, it has priority over *goha* for the purpose of scientific nomenclature and this is why the 'Indian Trout' has been known as *Barilius bola*. After Hamilton, McClelland (20, pp. 297, 298, 419, 420) referred to these fishes but placed them in a new genus *Opsarius* along with a very diversified group of species. The genus was characterised as follows:

'Mouth widely cleft, body slender, and usually marked with transverse green streaks or spots, dorsal small without spine, and placed behind the middle, anal long, lower margin of the body more arched than the upper.'

'Obs. Intestine very short, and extends almost straight from the stomach to the vent.'

He made some observations on the morphology and bionomics of the fishes of this composite genus, and described Hamilton's *C. goha* as *Opsarius gracilis* and *C. bola* as *O. megastomus*. Of the latter he had no specimen for examination and referred to its characters as given by Hamilton; while the former—the *Korang* of the Assamese—is described in some detail. Concerning this species McClelland remarks:

'This species occurs in all parts of Assam, in the Kosi, the Jumna, the Ganges and the Soane rivers; in which last Buchanan says it attains the size of a Herring, and is called Trout by the English, chiefly from the spots on the sides, and its fine flavour. For the latter I cannot answer; but as the species of this group are not much esteemed by the natives, I suspect it owes its imagined sweetness, in some degree, to its supposed resemblance to Trout. Notwithstanding the beauty of its appearance, its habits are such as to render it very objectionable in fish ponds.'

Both Cuvier and Valenciennes (6) and Bleeker (2) referred to Hamilton's two species as distinct forms, but they had no specimens for examination.

In 1858, Blyth (3) described *Leuciscus salmoides* from Allahabad and defined it as follows:

'Affined to *L. goha* (*Cyprinus Barilius goha* B.H., v. *Opsarius gracilis* McClelland); but larger and deeper in the body, with the spots smaller, much more numerous, and more regularly disposed, many of them occurring below the lateral line, and others on the opercula and preopercula: upper lip studded with pores.

D. 10; A. 13; P. 14; V. 9; C. 18.

Lateral line composed of 88 to 90 scales; and oblique series of 26 scales descending from anterior base of dorsal. Length of specimen 11 in.'

The larger specimen figured here from the Dehra Dun hills possesses all the special features noted by Blyth for his species, and is about 11 inches in length. But there can hardly be any doubt about its identity with Hamilton's species.

Steindachner's (22) description of the 'Indian Trout' is based on young specimens from 5 to 7 inches in length and his determination of the species as *Barilius goha* is based on Gray's drawing (11) in the *Illustrations of Indian Zoology*.

Günther (12), who examined young, half-grown and adult specimens of the species, was the first to combine Hamilton's two species into one and on account of its very wide mouth, extending beyond the eyes, he separated it into a new genus *Bola*

and designated the fish as *Bola goha*. Except for the width of the mouth there is no other special feature in which his genus differs from *Barilius*. He also indicated that *Opsarius* McClelland (in part) is a synonym of *Bola*. Day (7) pointed out that *Bola* Günther is 'preoccupied by Genus VI in Hamilton Buchanan's *Fishes of the Ganges*, p. 73', and instead revived *Opsarius* McClelland to accommodate Hamilton's *Cyprinus goha*. In his later works, however, Day (9, 10) did not consider this species generically distinct from other members of the genus *Barilius*, and accordingly regarded *Opsarius* McClelland as a synonym of *Barilius*.

In 1918, however, Jordan (18) proposed the name *Raiamas* as a 'substitute for *Bola* Günther, 1868, preoccupied by Hamilton' and designated *Cyprinus bola* Hamilton as the type of the genus. Evidently he was not aware of the fact that Day (7) had already restricted the use of *Opsarius* McClelland for *Bola* Günther. In his *Genera of Fishes* he (19) noted that *Opsarius* is 'apparently a synonym of *Barilius* Ham.' Chaudhuri (5), without looking properly into the contention of Jordan, revived the generic name *Bola* and erroneously regarded *C. bola* and *C. goha* as distinct species. Mukerji and I used the generic designation *Raiamas* in recording the 'Indian Trout' from the Dehra Dun hills, without looking into the past changes in the nomenclature of the species. If it be conceded that *Cyprinus bola*, with *C. goha* as a synonym, should be regarded generically different from other species of *Barilius* on account of its very wide mouth then its proper scientific title should be *Opsarius bola* (Hamilton), but the question whether *C. bola* is generically distinct from the other known species of *Barilius* still remains to be elucidated.

A glance at Day's figures of the various species of *Barilius* described in the *Fishes of India* (pls. cxlviii; cxlix; cli, fig. 2) shows that the extent of the mouth is a very variable character in this genus. In *B. guttatus* (Day) from Burma the cleft of the mouth is deep and extends for a considerable distance behind the eye. The suborbitals are also very broad, 'more especially the hindermost which is nearly behind the vertical from the posterior margin of the orbit, and almost covers the cheek.' In these respects the species agrees very closely with *B. bola* and was originally described under the generic designation *Opsarius* (8). In *B. tileo*, *B. gatensis*, *B. bakeri*, *B. modestus* and *B. vagra* the posterior extremity of the maxilla extends to beneath the middle of the orbit and the suborbital bones cover a considerable part of the cheek. In *B. bendilisis*, *B. barila*, *B. canarensis* and *B. barna* the posterior extremity of the maxilla reaches to below the anterior third of the orbit, while in the remaining species—*B. evezardi*, *B. shacra* and *B. radiolatus*—the maxilla just reaches the margin of the orbit. It is clear from the above that though no generic importance can be attached to the extent of the mouth, the condition in *B. guttatus* and *B. bola* is sufficiently characteristic to warrant their inclusion in a separate group within the genus *Barilius*. I, therefore, propose to call the 'Indian Trout' *Barilius (Opsarius) bola* Ham.

Systematic Position.

The genus *Barilius* belongs to the sub-family Rasborinae of the family Cyprinidae, usually known as Carps (Order: Ostario-physi; Sub-order: Cyprinoidea). In the fishes of this family the head and the body are usually compressed and, except in a few cases, the pectoral and the ventral fins are inserted along the sides and possess only one simple ray. There is no spine below the eye which has a free orbital margin or a gelatinous eyelid. The mouth is inferior or terminal; its upper border is formed by the premaxillaries only. There are never more than two pairs of barbels. The body is covered with scales and the lateral line is generally complete. The pharyngeal teeth are present in one, two or three series. The air-bladder is usually large and free in the abdominal cavity.

In the Rasborinae the abdominal surface is not compressed into a sharp edge. As a rule, the lower jaw is provided with a symphyseal knob, fitting in an emargination of the upper jaw. The dorsal fin is without an osseous spine and is situated behind the ventrals. The lateral line abruptly bends downwards and, when complete, runs along the lower half of the tail.

The members of the genus *Barilius* are characterised by their compressed snout and anterior mouth. Moreover, they usually possess spots or vertical bars on the body. In the sub-genus *Opsarius*, as indicated above, the cleft of the mouth extends beyond the eye. Besides the 'Indian Trout', there is only one other species—*B. (Opsarius) guttatus* Day—which possesses this character; it is found in Burma and possesses 44-48 scales along the lateral line (*versus* 88-94 in *bola*).

*Description and Distribution.***Barilius (Opsarius) bola** Hamilton.

THE INDIAN TROUT.

Vernacular names.—*Buggah* (Orissa); *Korang* (Assam); *Bola* (Bengal); *Buggarah* (Hindi); *Goha* (Purniah Dist.); *Bhola Goalpara*, *Na-laida* (Meechi); *Gulabi Machli* or rose-speckled fish.

B. iii; D. 3/7-8; A. 3/10; P. 13; V. 9; C. 19; L. 1. 88-94; L. tr. 12-15/9-11.

Barilius bola possesses the characteristic Trout-like form; its dorsal profile is scarcely arched, while its ventral profile is somewhat convex. The head and body are greatly compressed: the former is sharply pointed. The length of the head is contained from 4.3 to 4.6 times in the length without the caudal. The head is proportionately smaller in the younger individuals. The width of the head is considerably greater than the width of the body and is contained from 1.9 to 2.3 times in the length of the head; the height of the head is contained from 1.5 to 1.6 times in the same dimensions. The depth of the body is contained from 5.4 to 5.7 times in the total length and from 4.3 to 4.6 times in the length without the caudal. The caudal peduncle is well

formed; its least height is contained from 1.5 to 1.9 times in its length; in smaller individuals it is proportionately deeper.

The eye is situated slightly below the level of the dorsal profile and entirely in the anterior half of the head. In adult specimens the mouth opening extends about $1\frac{1}{2}$ diameters of the eye behind the posterior margin of the orbit. The eye is proportionately much larger in the younger individuals; its diameter is contained from 5 to 7 times in the length of the head, from 1.4 to 2.1 times in the length of the snout and from 1.1 to 1.9 times in the inter-orbital width. The interorbital space is more or less flat. In some adult specimens the snout and cheeks are covered with 'pearl-organs'¹ and there are also tubercles on the dorsal surface of the anterior rays of the pectoral fin in single rows. The lower jaw is also covered with sharply pointed tubercles. Such specimens agree in every respect with Blyth's description of *Leuciscus salmoides* (*vide supra*, p. 202), and in my opinion represent the males of the species. Sufficient material is, however, not available to elucidate these sex differences. The mouth is very wide and obliquely directed upwards. The upper jaw is longer than the lower and is deeply notched in the middle to receive a very prominent knob of the lower jaw. The suborbital ring of bones is very wide, especially the third which in adults is as wide as the distance between its hind border and that of the operculum. The barbels are altogether absent. The scales are very small. The lateral line is curved anteriorly and then it is continued to the lower half of the base of the caudal fin.

The dorsal fin commences somewhat behind the anterior origin of the ventral and its free edge is only slightly curved; its commencement is equidistant between the anterior margin of the orbit and the base of the caudal fin in young specimens while in the adults it is midway between the posterior margin of the orbit and the base of the caudal fin; it is considerably higher than long. The pectoral fin is almost as long as the head behind the eye and is separated from the ventral by a considerable distance; its outer rays are the longest, and there is a scaly appendage in its axil. The free border of the ventral fin is concave in the young specimens, while in the adult males three of the inner rays are somewhat produced so that they form a regular lobe; these elongated rays are probably used for clasping during copulation. The caudal fin is deeply forked with both the lobes equal and pointed.

In young individuals the colouration is much lighter than that of the adult. The back is greenish-gray and this is separated from the silvery portion below by a longitudinal golden stripe. The fins are yellow. The greenish-blue spots on the sides are oblong and their number in a specimen about 13 cm. in total length varies from 15 to 17. In between these spots, at a somewhat lower level, there are indications of a second series of spots. The middle portion of the lower lobe of the caudal as well as its posterior margin are grayish. With the growth of the fish the colours

¹ The term 'pearl organs' is used for the cornifications of the skin which take the form of small tubercles; these appear chiefly on the head of various Cyprinoid fishes at breeding time.

become much deeper and the yellow is replaced by orange. The spots become rounded and are irregularly distributed in many rows. In fully mature specimens they also occur on the preoperculum, the suborbital bones and the operculum. Day's description of the colouration of a fairly grown-up specimen is as follows:

'Silvery with two or more vertical rows of bluish blotches along the sides, the upper being about twelve to twenty, and the lower intermediate; some spots also on the head. Lower half of the dorsal fin slightly gray. Caudal orange, stained with gray and black. Pectoral, ventral and anal orange, the colours being somewhat similar to those of a trout.'

A colour drawing of the species was published by Spence and Prater (21) based on the drawing and description by Day in his *Fishes of India*. The specimens, of which the drawings are reproduced here, were collected by me from the Song River near Lachhiwala in the Dehra Dun District. Unfortunately no notes on colouration were taken in the field, but the details have been filled from the original drawings of the species prepared by Hamilton over a century and a quarter ago. These drawings are beautifully prepared and well preserved. The author has left notes to the effect that he always had them coloured from living specimens.

Distribution.—*Barilius bola* is confined to the hilly parts of the Punjab, United Provinces, Bihar, Orissa, Bengal, Assam and Burma. Day records that it grows to about a foot in length, but mentions that 'one killed in Assam by Mr. Hannay is stated to have weighed 5 lbs.' Usually it weighs under 2 lbs.

Measurements in millimetres.

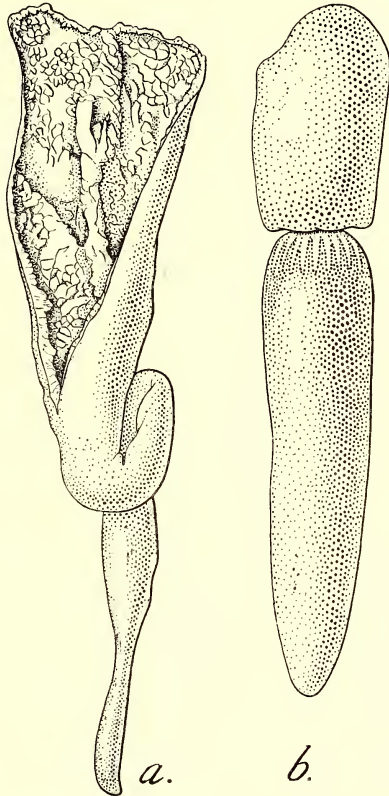
Total length including caudal	...	107·0	130·0	285·0	286·0
Length of caudal	...	22·0	28·0	55·0	55·0
Depth of body	...	19·0	23·0	50·0	53·0
Width of body	...	10·0	11·0	24·0	29·0
Length of head	...	23·0	29·5	65·0	65·5
Width of head	...	12·0	15·0	28·5	32·0
Height of head at occiput	...	15·0	19·0	41·5	41·0
Length of snout	...	6·3	9·0	18·0	19·0
Interorbital width	...	5·0	8·0	17·0	18·0
Diameter of eye	...	4·5	6·0	9·3	9·3
Longest ray of dorsal	...	15·0	18·5	39·0	39·5
Longest ray of anal	...	13·0	17·0	34·0	35·0
Length of pectoral	...	15·0	19·0	41·0	41·0
Length of ventral	...	11·5	14·0	32·0	32·5
Length of caudal peduncle	...	14·0	17·0	41·0	41·0
Least height of caudal peduncle	...	9·0	10·0	22·0	22·0
Length of maxilla	...	13·0	17·0	37·0	37·0

BIONOMICS AND FISHING NOTES.

Thomas (23), on the authority of his several correspondents and personal experience, has given copious notes regarding the

habits, habitat, occurrence in various localities and the type of rod and tackle required to deal with this fish. Those desirous of obtaining full details may consult this invaluable work in original.

The 'Indian Trout' is found in many rivers of Northern India where it lives in clear streams with rocky beds. Generally it prefers junctions¹ of streams or rapids at the head of pools. In such situations it preys on smaller fish and is thus very destructive to fisheries in general. I have also found remains of insects (of a dragon fly) inside the stomach of one of the individuals collected in the Song River. Its wide mouth and stream-lined body are admirably adapted for a predacious life and the form and structure



Text-fig. 1.—Alimentary canal and air-bladder of *Barilius (Opsarius) bola* Ham. Nat. size. From a specimen about 11 in. in total length.

a. Alimentary canal: anterior part of stomach is cut open to show the nature of its internal wall; *b.* Air-bladder.

of its alimentary canal (fig. 1*a*) leave no doubt that it is a highly carnivorous species. McClelland (20) noted:

'The stomach is equal to about half the entire length of animal, and the intestine from the stomach to the vent only about half the length of the

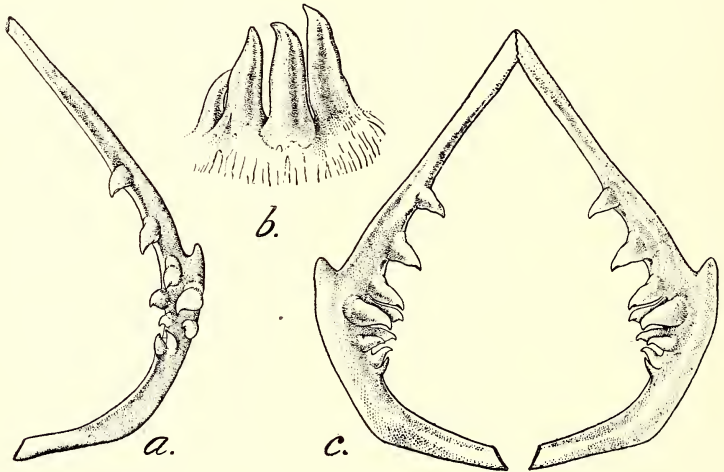
¹ The advantages of such a habitat were pointed out by me in the account of 'Fish of Chitral' (16).

stomach itself, and separated from that organ, which it rivals in capacity, merely by a stricture.

The liver and other large glands whose functions are supposed to facilitate digestion are extremely small in this species, though it is possessed of an insatiable carnivorous appetite; nor have I found in Cyprinidae, in general, those glands bear any proportion to the size of the stomach, or the nature of the food in different species.

The inner surface of the stomach is raised into folds running in various directions (fig. 1a) which help to increase the glandular area meant for the secretion of the gastric juice. The liver, though short in the anterior region, extends along the stomach as noted by McClelland in his general account of the genus *Opsarius*. This peculiar disposition of the liver, and also of the kidneys, which extend along the entire dorsal wall of the body cavity, is brought about by the compression of the body which has resulted in the great reduction of the space inside the body cavity. Moreover, *B. bola* possesses a large air-bladder (fig. 1b) which is long and narrow but extends throughout the length of the abdomen. This indicates the importance of the air-bladder in the economy of life of this species which has been sometimes observed to swim near the surface with a part of its head almost out of water.

The pharyngeal teeth of *Barilius bola* (figs. 2 and 3) are sharp at the distal end and produced into a point; the distal portion

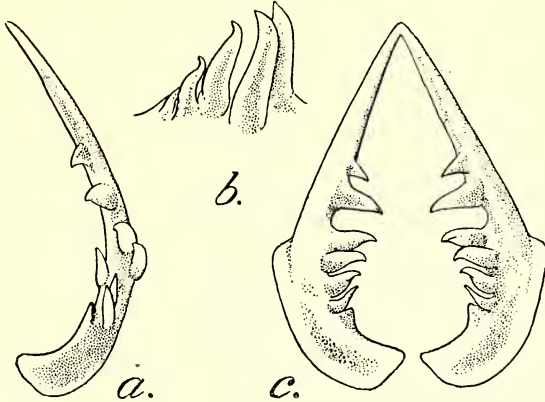


Text-fig. 2.—Pharyngeal bones and teeth of an adult specimen of *Barilius* (*Opsarius*) *bola* Ham.

- a. Pharyngeal bone and teeth from the inner side, $\times 2\frac{2}{3}$; b. Some of the pharyngeal teeth magnified to show their form, $\times 4$; c. Pharyngeal bones and teeth in their normal position, $\times 2\frac{2}{3}$. From a specimen about 11 in. in length.

is somewhat curved so that the form is blade-like. Such types of teeth are undoubtedly meant for tearing up prey or holding it firmly during ingestion. In the young specimens the teeth

(fig. 3) are more slender and the outermost row contains only 4 teeth (4.3.1), while in the adult condition there are 5 teeth in the outermost row and the teeth are somewhat more massive.



Text-fig. 3.—Pharyngeal bones and teeth of a young specimen of *Barilius* (*Opsarius*) *bola* Ham.

a. Pharyngeal bone and teeth from the inner side, $\times 8$; b. Some of the pharyngeal teeth magnified to show their form, $\times 12$; c. Pharyngeal bones and teeth in their normal position, $\times 8$. From a specimen 4.2 in. in length.

According to Day, 'It is a very game fish, takes the fly well, and is one of those termed *Rajah mas*, or "chief of the fishes" in the Assam rivers.' In the Dehra Dun hills another species of *Barilius*, *B. bendilisis* Hamilton, is used as a bait for the 'Indian Trout'.

The 'Indian Trout' is usually fished with a fly, a small spinning bait, or tiny spoon. 'A small fly with white wings, is, perhaps, best. On being hooked, it jumps repeatedly out of the water and rushes about furiously, fighting gamely to the last. The lightest ten-foot fly rod is recommended with extra fine gut casts.'

So far as I am aware, no information is available regarding the breeding habits of the Indian Trout.

The Bombay Natural History Society very kindly made a grant towards the cost of illustrations and for this I have to offer my sincere thanks to the authorities of the Society.

LIST OF REFERENCES.

1. Annandale, N., and Hora, S. L. 'The Fish of Seistan.' *Rec. Ind. Mus.*, vol. xviii, p. 154 (1920).
2. Bleeker, P. 'Nalezingen op de ichthyologische fauna van Bengalen en Hindostan.' *Verh. Bat. Gen.*, vol. xxv, pp. 66, 68 (1854).
3. Blyth, E. 'Report of Curator, Zoological Department, for May 1858, Andaman Misc. Fishes.' *Journ., As. Soc., Bengal*, vol. xxvii, p. 289 (1858).

¹ Cretin, Lacy's *The Angler's Handbook for India*, 4th ed., p. 123 (Calcutta, 1905).

4. Buchanan (afterwards Hamilton), F. *A Journey from Madras through the Countries of Mysore, Canara and Malabar, etc.*, vol. iii, p. 345, pl. xxxii (London, 1807).
5. Chaudhuri, B. L. 'Note on a Supposed New Indian Genus.' *Rec. Ind. Mus.*, vol. xix, p. 29 (1920).
6. Cuvier, M., and Valenciennes, M. A. *Histoire naturelle des Poissons*, vol. xvi, pp. 423-4 (Paris, 1842).
7. Day, F. 'On the Fishes of Orissa.' *Proc. Zool. Soc., London*, p. 379 (1869).
8. Day, F. 'On the Freshwater Fishes of Burma', Part I. *Proc. Zool. Soc., London*, p. 620 (1869).
9. Day, F. *Fishes of India*, pp. 508, 588-94 (London, 1889).
10. Day, F. 'Fishes' in *Fauna of British India*, vol. i, p. 352 (London, 1889).
11. Gray, J. E. *Illustrations of Indian Zoology*, vol. i, pl. lxxxvi, fig. 2, lxxxvii, fig. 3, xciv, fig. 1 (London, 1830-34).
12. Günther, A. C. L. *Catalogue of Fishes in the British Museum*, vol. vii, p. 293 (London, 1868).
13. Hamilton, F. *An Account of the Fishes Found in the River Ganges and its Branches*, pp. 266-76 (Edinburgh, 1822).
14. Hora, S. L. 'An Aid to the Study of Hamilton Buchanan's "Gangetic Fishes".' *Mem. Ind. Mus.*, vol. ix, p. 189 (1929).
15. Hora, S. L. 'Fish of Afghanistan.' *Journ., Bombay Nat. Hist. Soc.*, vol. xxxvi, p. 700 (1933).
16. Hora, S. L. 'The Fish of Chitral.' *Rec. Ind. Mus.*, vol. xxxvi, p. 282 (1934).
17. Hora, S. L., and Mukerji, D. D. 'Fish of the Eastern Doons, United Provinces.' *Rec. Ind. Mus.*, vol. xxxviii, p. 138 (1936).
18. Jordan, D. S. 'New Genera of Fishes.' *Proc. Acad. Nat. Sci. Philadelphia*, vol. lxx, p. 344 (1918).
19. Jordan, D. S. *The Genera of Fishes*, p. 195 (California, 1919).
20. McClelland, J. 'Indian Cyprinidae.' *As. Res.*, pp. 295-8, 415-23; vol. xix, pl. xlvi, figs. 5, 8, 9; lvi, figs. 1, 5 (1839).
21. Spence, R., and Prater, S. H. 'Game Fishes of Bombay, the Deccan and the Neighbouring Districts of the Bombay Presidency: V. Fishes Suitable for Introduction in Local Waters.' *Journ., Bombay Nat. Hist. Soc.*, vol. xxxv, p. 62, pl. xviii (1932).
22. Steindachner, F. 'Über einige Cyprinoiden aus Ostindien.' *Sitz. Ak. Wiss. Wien*, vol. lvi, p. 369 (1867).
23. Thomas, H. A. *Rod in India*, 3rd ed., p. 186 (London, 1897).

EXPLANATION OF PLATE.

Lateral view of a young and an adult specimen of the Indian Trout, *Barilius (Opsarius) bola* Hamilton. $\times \frac{2}{3}$.

The specimens were collected from the Song River near Lachhiwala in the Debra Dun District, United Provinces.

(To be continued).